

JUSTIFICATION FOR OTHER THAN FULL AND OPEN COMPETITION OVER \$150,000
Advanced Plant Habitat (APH)

1. This document is a justification for other than full and open competition prepared by NASA, John F. Kennedy Space Center.

2. The nature and/or description of the action being approved:

This justification provides the rationale for contracting by other than full and open competition for the acquisition of the Plant Habitat (PH) payloads, subsystems/Orbital Replacement Unit (ORU), and parts to repair the subsystems/ORU.

3. Description of the supplies or services required (including the estimated value and period of performance).

NASA Kennedy Space Center (KSC) will acquire PH payloads to include fabricating and testing (qualification, acceptance and verification) of two (2) flight units. Each flight unit will consist of subsystems (e.g. Growth Light Assembly (GLA), avionics unit, Water Recovery and Delivery System (WRADS), Environmental Control System (ECS), Power Distribution Assembly (PDA), Thermal Control System (TCS), and growth chamber for implementation on the International Space Station (ISS). In addition, two sets of ORU's for the flight units shall be acquired. To support ORU's and the Engineering Development Unit (EDU) prototype repairs, a select number of flight and ground parts will be acquired.

Research on the ISS focuses on meeting the needs of long-term spaceflight to destinations such as asteroids or Mars. NASA/KSC is developing a PH with a large growth chamber to learn the effects of long-duration microgravity exposure to plants in space. The PH is going to be the largest environmentally controlled plant growth chamber that will be onboard the ISS. PH is configured as a payload that will be mounted on a standard Expedite the Processing of Experiments to Space Station (EXPRESS) rack.

The estimated value for this effort is \$9.7M, with a period of performance from FY15 through FY19. The PH is planned to launch on a SpaceX Dragon spacecraft around June 2016, and the ORU's will be procured during FY17 and FY19.

4. Statutory authority permitting other than full and open competition:

The statutory authority for permitting other than full and open competition is 10 U.S.C. 2304 (d)(1)(B) which provides that full and open competition need not be provided "in the case of a follow-on contract for the continued development or production of a major system or highly specialized equipment, or the continued provision of highly

specialized services.” This authority is also pursuant to Federal Acquisition Regulation (FAR) 6.302-1 (a)(2)(iii) which states “services may be deemed to be available only from the original source in the case of follow-on contracts for the continued provision of highly specialized services”. Orbital Technologies Corp. (ORBITEC) has the unique capabilities to evolve from the preliminary and critical design reviews under contract NNK12MA35B and into the fabrication and certification phase that’s required for producing flight ready PH hardware. There would be substantial duplication in effort and cost to solicit new sources. Areas of duplication would include efforts to accomplish the Preliminary Design Review (PDR), Critical Design Review (CDR), and EDU testing. The estimated value and impact to duplicate these efforts is \$3.2M based on actual costs incurred under the current contract NNK12MA35B.

5. A demonstration that the proposed contractor’s unique qualifications or the nature of the acquisition requires use of the authority cited:

ORBITEC is a leading subsystems integrator and high-technology development company and has years of experience developing plant-related payload hardware that has flown to the ISS. The contractor has been involved in the development of Space plant growth facilities, which includes the Biomass Production System (BPS), Plant Research Unit (PRU), AstroGarden, Vegetable Production System (VEGGIE), Astroculture, Advanced Astroculture (ADVASC), and the Commercial Plant Biotechnology Facility (CPBF). For the assembly of the PH payload, the contractor will utilize hardware and software design documentation and prototypes developed and approved under the preliminary and critical design phases acquired under KSC contract NNK12MA35B.

Payload integration and operation support is a NASA led effort with ORBITEC supporting NASA since the beginning of this project in FY12. In order to expedite this capability on the ISS and maximize the use of PH, NASA will require the unique capabilities of ORBITEC to evolve from the PDRs into the fabrication and certification phase. During the review, the contractor reported on how the project is progressing to ensure the design meets system requirements within acceptable risk and falls within schedule and budget constraints. One of the design challenges the contractor has unique insight into dealing with the physical size, power requirements, and especially the fluid systems (water delivery system for the plant, temperature and humidity control system, and CO2 systems). The weight, volume and maximizing valuable space station resources (power and water) are an important consideration for any payload designed for spaceflight.

The contractor has knowledge and experience in developing flight hardware and plant-related payloads on the Space Shuttle and ISS, and currently utilizes the same skill mix of electrical engineers, mechanical engineers, and software engineers in developing Light Emitting Diode (LED) plant lighting and capillary interface nutrient/water delivery and humidity control systems used for plant payloads in space. ORBITEC has put these experienced engineers on the PH project and it includes the lead mechanical

designer of the Wisconsin Center for Space Automation and Robotics (WCSAR) CPBF which was an equivalent payload in power and volume to PH and allows the entire lesson learned to be applied to this project (especially to control temperature, humidity, carbon dioxide levels and lighting).

6. Description of the efforts made to ensure that offers are solicited from as many potential sources as practicable:

As explained herein, this contract is a follow-on to the PDR and CDR for the development of the EDU prototype. It would be impractical, costly and ineffective for NASA to solicit and award to another source for this Research and Development (R&D) effort. NASA will require the unique capabilities of ORBITEC to evolve from the preliminary design reviews into the fabrication and certification phase that's required for producing flight ready PH hardware. Another source would be inexperienced on the design and the unknown amount of time required for another source to learn the design and then build the PH payloads and subsystems/ORU, would cause additional costs to be incurred.

A synopsis was published in the Government wide point of entry (e.g. Fedbizopps) in accordance with FAR 5.201. See details of results in Section 8 below.

7. Determination by the Contracting Officer that the anticipated cost to the Government will be fair and reasonable:

The anticipated cost for the required support will be determined fair and reasonable based on individual firm-fixed price and/or time and material task orders to be issued under the contract which will be negotiated between NASA and ORBITEC. The Contracting Officer (CO) and the Contracting Officer's Representative (COR) will monitor ORBITEC's performance under the time and material orders to ensure cost control.

8. Description of the market research conducted (Part 10) and the results, or a statement of the reasons a market research was not conducted:

Market research consisted of consulting with the COR and performing Internet searches for other sources capable of designing and developing plant habitats for use in space. ORBITEC remains the only known company that can meet NASA's requirements.

A synopsis was published in the Government wide point of entry (e.g. Fedbizopps) in accordance with FAR 5.201, which provides opportunity for other interested sources to identify their capabilities and qualifications. Such qualifications would be evaluated for the purpose of determining whether or not to conduct this procurement on a competitive basis.

ZIN Technologies of Cleveland, Ohio, responded to the announcement as an interested source. The technical assessment stated that ZIN Technologies provides some of the capabilities that are required for the APH project like hardware development, software development, fabrication, and certification for flight. However, ZIN Technologies did not demonstrate the experience in the development of a payload for plant biology and the multiple elements that must be considered to be successful through various life cycles of plant biology. Experience with plant biology and plant biology in microgravity are the key elements, especially in the areas of the watering system, lighting system, temperature system, nutrient system, and the atmosphere control system that leads to the success of the mission. ORBITEC has the experience with developing plant biology payloads like the BPS and VEGGIE and has demonstrated the success of meeting the key elements and key areas for success. ORBITEC also employs the lead mechanical engineer and lead software engineer that worked on the first generation Quad Locker Plant Biology payload CPBF which PH is modeled from.

9. Other facts supporting the use of other than full and open competition, such as:

The KSC Ground Processing & Research (GP&R) office has made a commitment to the ISS Program Office that the PH payload will be ready for flight by FY16. Any impacts to this delivery date has impacts to the limited budget available to complete the build and certification of these payloads and the future Principal Investigators (PI's) that are waiting to use this payload to perform research. The PH project approach required a contractor with experience that would give the payload the maximum life on the ISS. ORBITEC has this experience through their past work with VEGGIE and the previous APH contract. As stated in Section 4 above, if ORBITEC is not the prime contractor supporting the build and certification of the PH, there will be cost incurred due to the inexperience of another contractor on the design (approximately \$3.2M) and it would take a significant amount of time for another contractor to learn the design. Based on the current contract, design would take approximately another 2 years, exceeding the approximately 18 months currently anticipated to complete the build of the PH payloads and ORU's.

10. A listing of sources, if any, that expressed in writing an interest in the acquisition:

ZIN Technologies of Cleveland, Ohio. See question 8 above on the results of the market research.

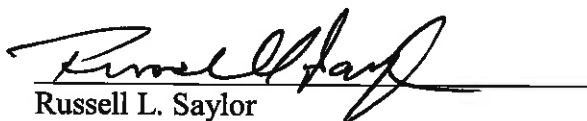
11. A statement of the actions, if any, the Agency may take to remove or overcome any barriers to competition before any subsequent acquisition for the supplies or services required:

The agency continually attempts to overcome barriers to competition by analyzing different sources that might be qualified for similar future acquisitions. However, the

unique nature of the APH project does not lend itself to this goal. If the requirement changes, the Agency will begin surveying the market for new sources.

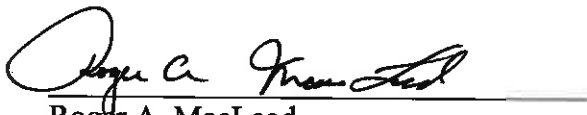
Justification for:
Advanced Plant Habitat

Technical Officer: I certify that the supporting data presented in this justification are accurate and complete.


Russell L. Saylor
AST, Technical Resources Management

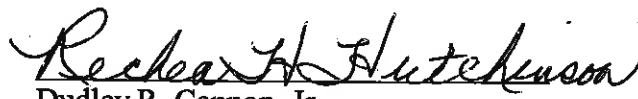
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(Date)

Contracting Officer: I certify that this justification is accurate and complete to the best of my knowledge and belief.


Roger A. MacLeod
Contracting Officer

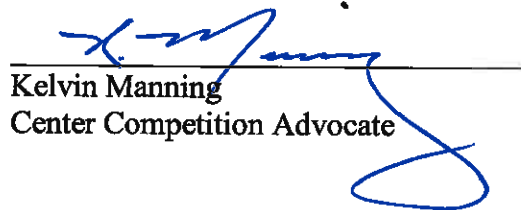
9/9/2014
(Date)

CONCURRENCE:

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9/11/14
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APPROVED:


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9/12/14
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